

**Document #689 Comment #1 Commentor: Grand County Council**

The Grand County Council would like to thank the Department of Energy for the time devoted to the issue of remediation of the Atlas tailings pile. We recognize your agency has spent many years studying this issue and has been diligent in allowing for public input. We appreciate having this opportunity to formally respond to your study. The County, in fact, has anxiously anticipated the Draft Environmental Impact Statement on the Atlas tailings pile located at the gateway of our community on the shores of the Colorado River. After thoroughly reading and evaluating the DEIS, we would like to relay to you some continuing concerns regarding the disposition of the pile.

**Response:**

DOE appreciates the recognition of the efforts made to allow public and agency input into this important decision-making process. The efforts of the county as a cooperating agency have resulted in significant contributions to the generation of this EIS.

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**Document #689 Comment #2 Commentor: Grand County Council**

First, it appears that much of the document, Remediation of the Moab Uranium Mill Tailings, Grand and San Juan Counties, Utah, Draft Environmental Impact Statement, was based on research that was conducted in 1994. Rather than approaching the subject from a broad spectrum of alternatives, the old research tends to be myopic and focus only on capping the pile in place. Newer studies approached the issue more comprehensively and used more current scientific tools and modeling. It is significant that the conclusions of all of these studies are in direct conflict with those reached by the DOE. All of the newer data suggests that moving the tailings pile is the most appropriate solution for the health and safety of all western states that rely upon the water of the Colorado River. These studies, conducted independently by the United States Geological Survey, Dr. Kip Solomon of the University of Utah, and Dr. John Dohrenwend of the University of Arizona, contradicted all of the DOE's findings regarding the stability and migration of the Colorado River. It is Grand County's position that the DOE simply did not utilize the most available and current science and that these later studies and their conclusions should be acknowledged.

**Response:**

Most of the technical information and modeling studies presented in the EIS are based on new data collected by DOE after 2001. They are presented in calculation sets and in the SOWP (DOE 2003a). The scope of DOE analyses also extends beyond research that was conducted in 1994 in that DOE evaluated a no action alternative and three off-site disposal alternatives in addition to on-site disposal, as required by NEPA. DOE acknowledges the work performed by the University of Utah, the University of Arizona, and the study conducted by the USGS, but disagrees that their results contradict all of DOE's findings regarding the stability and migration of the Colorado River. Further discussion of these responsible opposing views has been included in Section 2.6.4 of the EIS.

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**Document #689 Comment #3 Commentor: Grand County Council**

It also appears that the DEIS did not take into consideration the findings of the National Academy of Science. At the core of the NAS Committee's findings is the conclusion that the DOE has made some dangerous assumptions regarding the stability of the Colorado River in its relationship to the Atlas tailings pile. These assumptions and uncertainties discredit the DEIS and cause Grand County to insist the DOE proceed with the solution that will afford the greatest level of protection to the health and safety of the public. That solution is to move the tailings pile to a safer location within Grand County.

**Response:**

The NAS report to the Department, dated June 11, 2002, stated, "While one cannot predict the timing of river migration (over the coming millennia or in the next several decades), the committee sees it as a near certainty that the river's course will run across the Moab site at some time in the future, unless engineered barriers prevent it from doing so." The Department agrees with the NAS conclusion that at some point in the future, especially considering geologic time, the river will cross the Moab site. The Department's analyses conclude that engineering controls (see Section 2.1.1.1) can be used to resolve this issue for the near term (200 to 1,000 years). If on-site disposal were selected, the cell would include side slopes armored with riprap of sufficient size to resist erosion from floodwaters. The design would also include a barrier wall between the river and the capped pile to mitigate against river encroachment. These measures would further reduce the already low probability of catastrophic failure of an on-site disposal cell. In addition, a new Section 2.6.4 (Responsible Opposing Views) has been added to the EIS. It includes a detailed discussion of DOE's view and responsible opposing views on river migration.

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**Document #689 Comment #4 Commentor: Grand County Council**

Briefly, the NAS findings, with which Grand County concurs, include the following points:

1) It cannot be assumed that the course of the Colorado River will remain in its current position over the next 1000 (or more) years. Specifically, their study states it is a "near certainty that the river's course will run across the Moab Site at some time in the future."

**Response:**

See response to comment #3.

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**Document #689 Comment #5 Commentor: Grand County Council**

2) It is not accurate to suggest there is a low potential for lateral migration of the Colorado River. The NAS states that the DOE appears to be “overly optimistic” with regard to the migration of the river. Indeed, lateral movement of the river channel away from and toward the pile has been observed since this stretch of the Colorado River was first surveyed for possible dams in 1944.

**Response:**

See response to comment #3.

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**Document #689 Comment #6 Commentor: Grand County Council**

Additionally, while the DOE analysis supports the position that “any potential river migration toward the pile would not occur as a catastrophic event but rather gradually in small increments...” Grand County does not believe this is a valid assumption. There is historical data substantiating floods flowing at 66,100 cubic feet per second (cfs), (1914) 76,800 cfs (1917), 65,000 (1928), 64,400 cfs (1941), 64,200 cfs (1957), 61,900 (1983) and 70,300 (1984). Additionally, a flow of 125,000 cfs was analytically presumed to have occurred in 1884. The river begins to encroach the pile starting at the lowest of these flows. Should the worst event occur, water contaminated by the highly hazardous material could actually encroach into the City of Moab leaving residential and agricultural land contaminated.

**Response:**

The EIS acknowledges the potential for flooding of the tailings pile under the on-site disposal alternative and quantifies the impacts that could result from such inundation (Section 4.1.3.1). These impacts include additional leaching of contaminants into the ground water and subsequent migration to the river. As stated in the EIS, an on-site disposal cell (Section 2.1.1.3) would include side slopes armored with riprap of sufficient size to resist erosion from floodwaters. The design would also include a barrier wall between the river and the capped pile to mitigate against river encroachment. These measures would reduce the already low likelihood of catastrophic failure of an on-site disposal cell. USGS data on potential flood velocities that might occur at the pile would be used for the final design of the riprap side slopes and the barrier wall if this alternative were selected.

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**Document #689 Comment #7 Commentor: Grand County Council**

It is Grand County's position that the DOE cannot and should not make the assumption that a catastrophic event will not occur. The power of water, illustrated most dramatically by the tsunami that occurred in the Indian Ocean killing a quarter of a million people, mocks science and technology and renders short-term statistical analysis meaningless. Closer to home we have seen the same powerful impacts of water throughout California and southern Utah as homes have been swept past barriers into the sea and rivers from catastrophic rainfall and flooding.

**Response:**

DOE's analyses find that there are no probable mechanisms for catastrophic failure; however, for purposes of supporting decision-making, the consequences of such a failure have been included in the EIS (Section 4.1.17), and the differing opinions and uncertainties regarding this position are included in Section 2.6 (also see response to comment #6).

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**Document #689 Comment #8 Commentor: Grand County Council**

We also cannot dismiss the presence of two reservoirs upstream from the Moab Site that have never been studied in terms of their impact in the event they fail as the result of a natural disaster or an act of human terrorism. The sudden release of those waters into the Colorado would represent a wholly unpredictable catastrophic event.

**Response:**

DOE did not analyze specifically the sudden release of water from the two reservoirs upstream of the Moab site because the impacts of a catastrophic flood were assessed generally. The EIS analyzes the impact of a generic catastrophic flood event (300,000 cfs), which is the NRC-specified PMF, and determined that it would have serious adverse impacts on riparian plant and animal life and would affect the health and safety of residents along the river and of river guides. Even though the on-site alternative would include armaments that would further reduce the already low likelihood of catastrophic failure from a PMF, Section 4.1.17 quantifies the impacts of a catastrophic pile failure. Anticipated periodic flooding from more frequent 100-year flood events is assessed in Section 4.1.3.1.

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**Document #689 Comment #9 Commentor: Grand County Council**

3) While the DOE believes that failure of engineered barriers and the consequences of such a failure can be managed, Grand County agrees with the NAS assessment of such an assumption that "...our society's capacity to guarantee that harm will be prevented is limited."

**Response:**

See response to comment #3.

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**Document #689 Comment #10 Commentor: Grand County Council**

4) The DOE states in the DEIS that a failure would produce “only small and transitory consequences downstream.” The NAS report concludes that contamination could appear along the Colorado River from Moab to Lake Powell, requiring remedial action over a long period of time, if only to determine that the threat in a particular year or season is minimal or to declare certain areas off limits. The report discusses the potential of “hot spots” on the beaches and sandbars that could shift from place to place, year to year, or even season to season. It also suggests that the Matheson Wetlands Preserve could be damaged. Additionally, their report explains that, “Many people value the river for its religious and spiritual significance, its dramatic natural beauty, its importance as a water resource, its symbolic representation of the entire region; its importance as an ecosystem, and its centrality to the regional economy.”

**Response:**

It is possible that pile failure could lead to downstream deposition of contaminated sediment in areas receiving considerable use by the public and result in higher exposures than those estimated in the EIS. Prediction of sediment behavior (including downstream deposition and partitioning to the surface water) in the event of pile failure is difficult and would depend on numerous factors. DOE believes that the assumptions used to assess risk in the EIS are adequately conservative and appropriate for this screening-level assessment of a highly unlikely event. DOE will consider the concerns of downstream users in its decision-making.

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**Document #689 Comment #11 Commentor: Grand County Council**

5) The DOE’s conclusion is that the life-cycle cost of moving the pile is substantially higher than that of capping it in place and there is no substantial difference in the cost of groundwater remediation and long-term management between the alternatives. For reasons outlined in the following paragraphs, Grand County cannot concur that the life-cycle cost of moving the pile is less than that of capping it in place.

**Response:**

DOE will take the county’s opinion into consideration in its final decision-making.

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**Document #689 Comment #12 Commentor: Grand County Council**

Among the most troubling oversights in the DEIS is the fact that the DOE dismissed any potential of damage to the environment or populations downstream from Grand County. The DEIS recognizes only minimal danger to the local area: “If 20 to 80 percent of the tailings pile were washed into the river, it would have serious adverse impacts on the riparian plant and animal life and would affect the health and safety of residents along the river and of river guides who many spend up to 50 days on the river in a given year. Such a flood event could also affect the tourist economy of Moab if users of the river corridor avoided the area after such an event.” (DEIS Summary pg. S-41)

This statement by the DOE grossly and negligently underestimates the environmental and human impact of a Possible Maximum Flood or any other catastrophic event associated with the Colorado River and the Atlas tailings pile. If the 130-acre pile comprised of 12 million tons of waste were to be washed into the Colorado River, the adverse impacts would be immeasurable. Widespread and possibly permanent damage would be sustained not only in Grand County but also throughout the lower basin of the Colorado River drainage and the West. Millions of people live in cities and towns that rely upon the water of the Colorado River for agricultural purposes and/or drinking water. Most notably, major metropolitan areas such as Las Vegas, Nevada, rely upon the water from the Colorado. Likewise Los Angeles and all of southern California are dependent upon this river. The entire Palo Verde Water District including the Imperial Valley and Mohawk water districts rely upon the water from the Colorado River. Lake Havasu City, Arizona, Parker, Arizona, and the entire Parker Strip subsist upon water from the Colorado. Native American Indian nations use the Colorado River for agriculture and the river is, in fact, the cornerstone of their lives. Blyth, California; Yuma, Arizona, and the country of Mexico would all be significantly and irreparably impacted by damage to the Colorado River. Additionally, the water from the Colorado River is used to irrigate agricultural lands that supply crops and produce to the entire United States. The damage to the American West would extend immeasurably beyond Moab.

We suspect that the cost of moving one of the largest radioactive waste sites in the United States is at the center of the decision. We must protest such thinking, however, because no matter how high the cost of moving the tailings pile now, that cost would pale in comparison to the cost of a near impossible remediation of the Colorado River from here to the coast in the event of a catastrophic event. Additionally, the millions upon millions of agricultural lands that would be contaminated in the event of a natural or human disaster involving the Atlas tailings pile would wreak havoc upon economies throughout Utah, Nevada, Arizona and California. The cost to human lives is, frankly, not quantifiable.

A significant portion of the DEIS is devoted to the consequences of uncertainties: “It is important that decision-makers are cognizant not only of the nature and range of uncertainties, inherent in the EIS but also of the potential consequences of these uncertainties.”

**Document #689 Comment #12 - continued**

**Response:**

Section 4.1.17 quantifies the impacts of a catastrophic failure under the on-site disposal alternative, even though the river velocities projected by the recent USGS studies, coupled with the side slope armament and river migration barrier, make catastrophic failure a highly unlikely event. The analyses show that the impacts of a catastrophic failure would not be detectable below Lake Powell, and even in Lake Powell would not be of sufficient concentrations to cause measurable effects on human health.

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**Document #689 Comment #13      Commentor: Grand County Council**

Finally, we would like to cite the Floyd D. Spence National Defense Authorization Act of 1999, which states:

“Subject to the availability of appropriations for this purpose, the Secretary shall conduct remediation at the Moab site in a safe and environmentally sound manner that takes into consideration the remedial action plan prepared pursuant to section 3405 (1) of the Strom Thurmond National Defense Authorization Act for Fiscal Year 1999 (10 U.S.C. 7420 note; Public Law 105-261), including – (A) Ground water restoration; and (B) the removal, to a site in the State of Utah, for permanent disposition and any necessary stabilization, of residual radioactive material and other contaminated material from the Moab site and the floodplain of the Colorado River.”

According to this federal law, we should not currently be participating in a debate as to whether or not to move the pile, but rather a discussion as to how quickly we can implement the transfer to a safe site.

**Response:**

DOE believes the commentor intended to cite the Floyd D. Spence National Defense Authorization Act for FY 2001, which does contain the language referenced. However, the Act also states in part that “The Secretary of Energy shall enter into arrangements with the National Academy of Sciences to obtain the technical advice, assistance, and recommendations of the National Academy of Sciences in objectively evaluating the costs, benefits and risks associated with *various remediation alternatives, including* removal or treatment of radioactive or other hazardous materials at the site [Section 3405 (i) – Remedial Action at Moab Site] ...” [emphasis added]. Consequently, the Department has complied with the Floyd D. Spence Act for 2001 by evaluating various remediation alternatives, including both on-site and off-site disposal. In addition, DOE has complied with the requirements of NEPA by considering the range of reasonable alternatives, which includes the on-site disposal alternative and a No Action alternative.

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**Document #689 Comment #14 Commentor: Grand County Council**

Just as Grand County, and all of southeastern Utah, was willing to step up to the plate and produce uranium for the United States during the Cold War, the County is now willing to help protect the whole of the American West from this imminent danger. We are willing to keep this hazardous radioactive waste in our own back yard. We are not asking that any other community take on the burden of storing this waste.

**Response:**

DOE appreciates the county's willingness to accept disposal within the county.

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**Document #689 Comment #15 Commentor: Grand County Council**

The DOE held the responsibility for ensuring that the information upon which it bases the remediation decision is sufficient and of high quality. Grand County does not believe that responsibility was met. Therefore, the members of the Grand County Council representing the citizens of Grand County, and with the welfare of millions more citizens in the states of Utah, Nevada, Arizona, and California in mind, most respectfully demand the Atlas tailings pile be moved to another location in Grand County. We believe there should be no compromise when it comes to the health and safety of the public.

**Response:**

DOE is confident in the quality of the data used in EIS, the integrity of the analyses performed, and the adequacy of the EIS to support its decision-making. DOE will continue to consider the county's views regarding relocating the pile in its decision-making.

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**Document #696 Comment #1      Commentor: Bruno, Jeanne-Marie—Park Water Company**

Park Water Company appreciates the opportunity to provide comments on the Draft Environmental Impact Statement for Remediation of the Moab Uranium Mill Tailings. Park Water Company (PWC) is an investor-owned water utility providing water service to approximately 150,000 people in Los Angeles and San Bernardino Counties.

The Colorado River is a critical primary and supplemental source of drinking water for over 20 million consumers in Southern California. PWC consumers in Los Angeles County receive 90% of their water from the Metropolitan Water District of Southern California, a major contractor of Colorado River water. Protection of this vital resource is of paramount importance.

**Response:**

DOE agrees with the commentor's views on the value of the Colorado River. The Department believes that any of the action alternatives analyzed in the EIS would be protective of the river.

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**Document #696 Comment #2      Commentor: Bruno, Jeanne-Marie**

The Moab uranium mill tailings, however, threatens drinking water quality of the downstream users. Uranium concentrations in the tailings pore water are already over 750 times higher than the federal maximum contaminant level, and there is indication that these levels will increase. Groundwater concentrations at the site also exceed federal and/or California drinking water standards for other constituents including arsenic, mercury, thallium and radium.

**Response:**

Section 3.1.7.3 has been revised to clarify that site-derived contamination currently affects only a localized portion of the river and cannot be detected 0.5 mile downstream of the site. As discussed in Section 2.3.1.1, the ground water beneath the Moab site meets the criteria under 40 CFR 192 for supplemental standards as a limited-use aquifer and would be managed as such, regardless of whether on-site or off-site disposal is selected. As characterized in the EIS, DOE's preferred alternative of active ground water remediation would eliminate future threats from the Moab tailings to the quality of drinking water for downstream users.

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**Document #696 Comment #3 Commentor: Bruno, Jeanne-Marie**

With both the “no action” and “on-site” alternatives, contaminated seepage will continue to leak from the tailings pile and into the Colorado River: Reliable and permanent protection can only be achieved by moving the tailings pile off-site. This is consistent with the State of Utah’s December 29, 2004 letter received by your agency that states that any remediation other than an off-site option is unacceptable. We strongly urge you to relocate the tailings pile.

**Response:**

DOE has considered the analyses provided in the EIS, the consequences of the uncertainties characterized in the EIS, and the comments received on the draft EIS. Based on these considerations, DOE has identified off-site disposal at the Crescent Junction site using rail transportation and active ground water remediation as its preferred alternatives for the remediation of the Moab mill tailings, vicinity properties, and contaminated ground water.

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**Document #699 Comment #1 Commentor: Livermore, Dave—The Nature Conservancy**

The Nature Conservancy (“Conservancy”) appreciates this opportunity to review and provide comments on the Remediation of the Moab Uranium Mill Tailings Draft Environmental Impact Statement (“DEIS”). The Conservancy is a non-profit organization with a mission of preserving the plants and animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. Supported by approximately one million members and 1,800 corporate sponsors, the Conservancy owns over 1,400 preserves - the largest private reserve system in the world. One such preserve is the Scott M. Matheson Wetlands Preserve (“Matheson Preserve”)<sup>1</sup>, which is located immediately across the Colorado River from the Moab Uranium Mill Tailings site. The Matheson Preserve is home to over 220 species of birds and is the last significant remaining wetlands on the Colorado River in Utah. As one of the nearest private landowners to the Moab Mill Site, we have much at stake and are very concerned that the Department of Energy (“DOE”) selects the appropriate course of action to protect our private property and the biological integrity of the Colorado River. The Conservancy believes that the best alternative will be to relocate the Moab Uranium Mill Tailings to either the Klondike Flats or Crescent Junction disposal sites.

<sup>1</sup>Note: The DEIS indicates that the Matheson Preserve is owned by the Utah Department of Wildlife Resources; in actuality the northern portion (425 acres) is owned by the Utah Division of Wildlife Resources and the southern portion (470 acres) is owned by the Conservancy. This should be corrected in the Final Environmental Impact Statement.

**Response:**

DOE appreciates the Conservancy’s role as a local landowner and custodian for the Matheson Wetlands Preserve. DOE will consider the Conservancy’s views regarding the best alternative for relocating the Moab uranium mill tailings in its final decision-making. Regardless of whether, in the Record of Decision, DOE ultimately selects the on-site or off-site disposal alternative, DOE is confident that the disposal cell would effectively isolate mill-related contaminants for the 200- to 1,000-year effectiveness period specified in 40 CFR 192. DOE is also confident that surface remediation combined with active ground water remediation and the final disposal cell design and construction would reduce the possibility of short-term and long-term impacts to human health and the environment to levels that would comply with the requirements of 40 CFR 192.

Section 3.1.12 of the EIS states that the Matheson Wetlands Preserve is jointly owned by UDWR and the Nature Conservancy.

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**Document #699 Comment #2 Commentor: Livermore, Dave**

Findings by Dr. D. K. Solomon and Phillip M. Gardner in a “Summary Report of Hydrologic Studies of the Scott M. Matheson Wetlands Preserve.”

In 2002, the Conservancy and the Utah Division of Wildlife Resources (“UDWR”) contracted with the University of Utah to investigate the hydrology of the Matheson Preserve, including sources of water to the wetland and the hydrologic connection between the wetland and the Moab Mill Tailings. Tritium, dissolved noble gas concentrations, and oxygen and deuterium isotope ratios were used to examine the sources and the history of the water present. Lithologic composition of the subsurface beneath the wetland was investigated by logging cores at three boreholes and examined together with the logs of 14 wells drilled by the DOE and borehole data presented by Doelling (2002). These methods, coupled with the analysis of groundwater uranium and ammonia concentrations, were used to explore the groundwater connection between the wetlands and the Moab Mill Tailings.

**Response:**

DOE is aware of these field activities and provided technical support to assist the University of Utah in collecting ground water samples on the Moab mill site. As discussed in more detail in the following response, migration of contaminants under the river to the Matheson Wetlands Preserve is one of three issues about which there are responsible opposing views; these views are discussed in Section 2.6.4 of the EIS.

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**Document #699 Comment #3 Commentor: Livermore, Dave**

**Hydrologic Connection Between the Matheson Preserve and the Moab Mill Tailings**

The river is not an absolute hydrologic barrier to groundwater movement. By examining and comparing borehole drill cores and logs, Solomon and Gardner were able to map the minimum extent of the thick permeable channel gravels which underlie the entire site (See Illustration A). These gravel deposits create a pathway for groundwater to underflow the Colorado River. Further, comparison of noble gases and tritium levels between the Glen Canyon Group Aquifer and the Matheson Preserve groundwater leads to the conclusion that water beneath the wetlands is coming from the north side of the river through these river gravels. Lastly, spatial distribution of uranium and ammonia found in wells on the Matheson Preserve suggests that uranium is migrating from the Moab Mill Tailings beneath the river and into the subsurface Matheson Preserve.

**Response:**

DOE disagrees with the University of Utah's (Gardner and Solomon [2003]) assertion that contaminated ground water (ammonia and uranium) is migrating under the Colorado River and reaching the Matheson Wetlands Preserve. DOE's conceptual model of ground water flow at and near the project site considers the Colorado River and perhaps a limited area just southeast of the river to be a site of both regional and local discharge for ground water. Ground water discharges to this area because the elevation of the river surface and shallow ground water to the immediate southeast is less than the flow potentials measured in ground water at the project site, in areas lying farther to the east and closer to the City of Moab, and in brine located below the river. Accordingly, ground water flow converges toward the river from all of these zones, and a ground water divide occurs either in the river itself or slightly east of the river. This flow pattern prevents water from migrating beneath the river to the Matheson Wetlands Preserve.

However, Gardner and Solomon's view is a responsible opposing view of the fate and transport of site-derived contaminants in ground water. This view states that these contaminants have migrated, and continue to migrate, under the Colorado River toward the Matheson Wetlands Preserve and that they pose a potential hazard to public health and the environment. This view is based primarily on the interpretation of three types of information: (1) a potentiometric surface map based on calculated hydraulic heads that account for the effects of salinity on flow potential, (2) measured uranium concentrations in ground water on both sides of the Colorado River, and (3) analysis of stable isotopes of the dissolved oxygen and hydrogen in ground water. Both views on the question of contaminant migration under the river are based on differing interpretations of technical data. A new section on responsible opposing views (Section 2.6.4) has been added to the EIS. The section presents both views in detail and also discusses the implications of these opposing views.

The uncertainty surrounding DOE's assumption about contamination affecting the Matheson Wetlands Preserve and the consequences are addressed in Tables S-1 and 2-33, item #11, of the EIS.

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**Document #699 Comment #4 Commentor: Livermore, Dave**

**A Foundation of Sand and Future Flood Events**

The core samples drilled on both sides of the river show that the Moab Mill Tailings rest on overbank deposits of very fine sands and silts that are 8 to 15 feet deep. Found beneath these fine soils is a large, continuous package of gravel and cobbles, up to 150 feet thick, that was deposited by the Colorado River during periods of large and very forceful floods. To determine the date of such past flood events, Solomon and Gardner used carbon -14 dating on organic matter found in the boreholes at depths of 24 and 30 feet. At 24 feet the organic matter was less than 100 years old, and at 30 feet less than 1000 years old. These tests clearly illustrate that two flood events within the past 1,000 years have scoured to depths of 24 feet and 30 feet thus eroding away the foundation of sand and silt upon which the tailings currently sit.

**Response:**

DOE acknowledges the commentor's concern regarding the potential for the Colorado River to erode the tailings during a very forceful flood. As stated in the EIS, an on-site disposal cell would include side slopes armored with riprap of 12 to 36 inches (Section 2.1.4) to resist erosion from floodwaters and a barrier wall between the river and the capped pile to mitigate impacts from river migration. These measures would further reduce the already low likelihood of a catastrophic failure of an on-site disposal cell. USGS data on potential flood velocities that might occur at the pile would be used for the final design of the riprap side slopes and the barrier wall should this alternative be selected. The descriptions of the conceptual cell cover and barrier wall design have been expanded in Sections 2.1.1.3 and 2.1.1.4 of the EIS to state that riprap materials would be sized to withstand the maximum river forces identified by USGS and that the barrier wall would be of sufficient length to mitigate against river encroachment.

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**Document #699 Comment #5 Commentor: Livermore, Dave**

**River Migration**

By mapping the known minimum extent of the subsurface channel gravel deposits as reconstructed from the well logs from both sides of the Colorado River, geologists can indicate the extent of past river migration. Illustration A clearly shows that the river has migrated to both the northwest and the southeast, and that the historic river bed is present beneath the current Moab Uranium Mill site. The DEIS uses engineering calculations to imply that the river will migrate only toward the southeast, and recognizes that there is some “uncertainty” in their migration model. However, the Solomon/Gardner findings unmistakably show that the river has historically occupied, and undoubtedly will again migrate in the direction of, the Moab Mill site.

**Response:**

DOE’s analyses in the EIS support a conclusion that the river will not migrate toward the pile during the 200- to 1,000-year regulatory time frame. There are responsible opposing views on the question of whether the Colorado River is migrating toward the tailings pile, which would tend to exacerbate flooding impacts, or away from the tailings pile, which would tend to mitigate flooding impacts. A new section has been added to the EIS (Section 2.6.4) to present these opposing views on river migration (and other topics) and summarize their technical basis and implications. DOE’s view is that although a conclusive prediction of future river movement is not possible, evidence suggests that the river is migrating, and will continue to migrate, to the south and east away from the existing tailings pile (see Section 2.6.4). The opposing view is that the river channel has not migrated away from the Moab millsite in the past 80 years, and that there is no reason to suppose that it will start to do so in the immediate future.

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**Document #699 Comment #6 Commentor: Livermore, Dave**

Findings of the U.S. Geological Survey in “Initial-Phase Investigation of Multi-Dimensional Streamflow Simulations in the Colorado River, Moab Valley, Grand County, Utah, 2004.”

The USGS recently completed a multi-dimensional stream flow model of the Colorado River near the Moab Mill Tailings. This model clearly shows the potential for developing a flow regime that exceeds the critical shear stress needed to scour the fine-grained deposits on which the Mill Tailings are founded. Although the application of rip rap at the toe of the Mill Tailings might armor the surface of the pile, it cannot prevent the river from undercutting the rip rap leading to failure. Unless the fine-grained deposits beneath the toe of pile are removed completely and replaced with rip rap that is founded on the underlying channel gravels, the rip rap armoring scheme is fundamentally flawed. As the cost of excavating the fine-grained deposits was not included in the cost estimates for the cap-in-place alternative, it too is fundamentally flawed.

**Response:**

DOE has reviewed the recent USGS report. The descriptions of the conceptual cell cover and barrier wall design have been expanded in Sections 2.1.1.3 and 2.1.1.4 of the EIS to state that riprap materials would be sized to withstand the maximum river forces recently identified in the USGS report and that the barrier wall would be of sufficient length to mitigate against river encroachment. If the on-site alternative were selected, the final design specifications for the wall (including, for example, its dimensions) would be developed in a remedial action plan. The estimated cost range for remediation (Table 2–33, item #9) would accommodate materials consistent with the USGS report.

Sections 4.1.17 and 2.6 of the EIS discuss the potential for the Colorado River to migrate and damage the tailings pile if the pile were not relocated. There are responsible opposing views regarding river migration. The EIS has been expanded to present and discuss these opposing views (Section 2.6.4). If on-site disposal were selected, the side slopes of the on-site disposal cell would be armored with riprap (Section 2.1.3.1) of sufficient size to resist erosion from floodwaters. The design would also include a barrier wall (Section 2.1.4) between the river and the capped pile to mitigate against river encroachment. These engineered designs would further reduce the already highly unlikely chance of a catastrophic failure of the disposal cell should river migration begin to occur unexpectedly.

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**Document #699 Comment #7 Commentor: Livermore, Dave**

Conclusions from the Above Studies

The DEIS treats the findings of the Solomon/Gardner study by acknowledging that uncertainties exist in their hydrologic and river migration model and that the State of Utah disagrees with DOE's conclusions. The Conservancy's interest in the immediate area and Colorado River system cause us to recommend vigorously that DOE, in the Final Environmental Impact Statement (FEIS), not gloss over the above findings as mere "disagreements" in models that are acknowledged to have "uncertainties". Rather, the FEIS must seriously consider and examine the data collected and conclusions of the Solomon/Gardner report and the latest information published by the USGS. Failure to do so may result in a potential mistake of catastrophic proportions – one that could have enormous, long-term adverse impacts on the Colorado River and the Matheson Preserve, including the species which depend upon these systems for their survival.

**Response:**

DOE has added a new Section 2.6.4, which specifically addresses the differing opinions on this and other issues and the consequences thereof.

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**Document #699 Comment #8 Commentor: Livermore, Dave**

Potential Impacts to the Matheson Preserve

The Matheson Preserve was created to ensure the lasting protection of an important desert wetland system and its associated biological diversity. To this end, the Conservancy and UDWR are managing the area to allow for the natural processes, such as flooding, that help to sustain the natural communities and critical wildlife habitat. Remediation of the Moab Mill Tailings has the following potential impacts to the Matheson Preserve.

Cap-in-Place Alternative

The On-site Disposal or Cap-in-Place alternative presents numerous concerns for the Conservancy and potential adverse impacts to the Matheson Wetlands Preserve. This alternative will reduce, but not eliminate, the leaching of contaminants into the groundwater beneath the wetlands. If this is the selected action, then the FEIS should include a ground water remediation system that protects, and does not negatively affect the Matheson Preserve. The estimated cost of such a system should be added to the cost of the Cap-in-Place Alternative.

Further, under this alternative a rip rap wall is designed to help prevent the possibility of flood events eroding the foundation of the pile.<sup>2</sup> Rip rapping the northwest shore of the Colorado River will certainly alter the morphology of the Colorado River, impact the opposite shoreline and add detrimental erosional forces on the shores of the Matheson Preserve.

Catastrophic failure of the Cap-in-Place alternative is possible due to 100 and 500 year flood events. The DEIS addresses this by indicating that there would be “only small and transitory consequences downstream.” However, a Landsat satellite image taken on May 26, 1984, while the Colorado River was flowing 66,500 cfs (less than a 100 year flood event) shows that the river would be lapping at the base of the tailings and flowing through the Matheson Preserve and neighboring properties. Therefore, in future floods of this magnitude or greater, contaminants currently leaching from the tailings into the river will be deposited in hot spots throughout the Matheson Preserve and surrounding residential areas. If this were to occur, the Conservancy would have no choice but to close the preserve to the public, and could do little to prevent resulting potential mortality to native animals and plants.

<sup>2</sup>Note: The Solomon/Gardner and USGS report illustrates that normal flood events will undermine the rip rap wall, erode away the fine silt and sand underlying the tailings, thus causing the tailings to spill into the Colorado River, questioning the effectiveness of any rip rap.

**Response:**

As discussed in the response to comment #3, DOE’s position is that site-related contaminants are not affecting the Matheson Wetlands Preserve.

Under the on-site disposal alternative, a buried riprap barrier wall would be installed as a river migration mitigation measure; however, the analysis in the EIS indicates that a flood of sufficient erosional magnitude to reach the wall and be deflected by it would be highly unlikely. DOE does not concur with the Conservancy’s opinion that a buried riprap wall would “certainly alter” the

**Document #699 Comment #8 - response continued**

morphology of the Colorado River sufficiently to adversely impact the opposite shore. Moreover, any attempt to assess such an impact would be speculative in the extreme.

The EIS acknowledges the potential for flooding of the tailings pile under the on-site alternative and quantifies the impacts that could result from such inundation. These impacts include additional leaching of contaminants into the ground water and subsequent migration to the river. As stated in the EIS, an on-site disposal cell would include side slopes armored with riprap of sufficient size to resist erosion from floodwaters. The design would also include a barrier wall between the river and the capped pile to mitigate against river encroachment. These measures would further reduce the already low likelihood of a catastrophic failure of an on-site disposal cell. If this alternative were selected, USGS data on potential flood velocities that might occur at the pile would be used for the final design of the riprap side slopes and the barrier wall. Although the impacts of a catastrophic failure are analyzed in Section 4.1.17 of the EIS in order to evaluate consequences and risks, DOE does not believe there are any credible scenarios that would result in a catastrophic disposal cell failure under the on-site disposal alternative.

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**Document #699 Comment #9      Commentor: Livermore, Dave**

Slurry Pipeline to White Mesa

The slurry pipeline route to White Mesa Mill disposal site indicates that the pipeline will cross the Matheson Preserve adjacent to an existing pipeline. The Conservancy will not willingly permit any further impact of either directional drilling or pipeline installation via open ditch through our property. The current pipeline easement allows one and only one pipeline.

Therefore, this alternative as shown in the DEIS is not viable – unless the DOE asserts eminent domain and forces the issue by condemning a pipeline easement through our private property.

**Response:**

DOE acknowledges the commentor's objection to the White Mesa Mill pipeline route. DOE will consider this comment in its final decision-making.

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**Document #699 Comment #10 Commentor: Livermore, Dave**

**Dike in the Colorado River**

In the mid-1960's the Atlas Mineral Cooperation constructed a dike in the Colorado River from the southeast shore to a midstream island. The purpose of this dike was to rechannel the main river flow to the northwest shore. The construction of this dike has undoubtedly reduced the frequency of flooding events in the Matheson Preserve. Flooding is a critical natural process which helps to regenerate Fremont cottonwood trees and retain year-round surface water. The Conservancy suggests that the DOE remediate this situation by removing the man-made dike, no matter which alternative is chosen.

**Response:**

This action is beyond the scope of the EIS; however, DOE will review this suggestion in the future.

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**Document #699 Comment #11 Commentor: Livermore, Dave**

Potential Impacts to Species of Concern

Endangered Fish and Species of Concern in the Colorado River

The DEIS acknowledges that the Colorado River has been designated as critical habitat for four endangered fish species: the Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), humpback chub (*Gila cypha*), and the bonytail (*Gila elegans*). Of the eight native fish species in the Colorado River, seven are listed as either federal or state species of concern. In 2000, the Columbia Biological Laboratory of the USGS measured 100% mortality of fish placed in cages near Moab Uranium Mill shore. The level of ammonia contamination considered acutely lethal is approximately 2 mg/l; USGS measured levels of 1,500 mg/l in areas of the river adjacent to the Moab Mill Tailings. Since that time DOE has started a ground water remediation system. However, the DEIS indicates that 15,000 gallons of toxic chemicals continue to reach the river each day. The DEIS also states that “At the upper limit of uncertainty, the actual concentrations of ammonia could be at least 10 times greater than predicted. Therefore, it is possible that the On-site Alternative would never achieve the 3-mg/L ammonia target goal. For the off-site alternative, there is no uncertainty that the target level would eventually be achieved, because the tailings which are the source of some of the ammonia would be removed.”

This statement alone indicates that the best solution to protect the endangered aquatic species and species of concern would be to move the tailings away from the shores of the Colorado River and the Matheson Preserve.

**Response:**

DOE is aware of the existing impacts from this former uranium processing site and of the USGS surveys. That is why DOE has implemented interim actions, in consultation with USF&WS, to help keep contaminants in the ground water from discharging to the river. Currently, 20 ground water extraction wells are in operation, and there are plans to install additional capacity in the summer of 2005. DOE also has implemented an extensive surface water and ground water sampling program to closely monitor contaminant levels in the river. Through continued ground water extraction for the next 75 to 80 years, as indicated in the EIS, DOE expects contaminants to be maintained at levels that are protective of aquatic life. After 75 to 80 years, ground water extraction would no longer be necessary. This is the case under both the on-site and off-site disposal alternatives.

While acknowledging the uncertainty associated with the applicable surface water compliance standards (see Tables S-1 and 2-33, item #2, of the EIS), DOE believes that the final disposal cell design and ground water remediation strategy, which would be developed in a remedial action plan after the Record of Decision is issued, would meet the requirements in 40 CFR 192 for environmental protection, regardless of whether the on-site or off-site disposal alternative were selected.

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**Document #699 Comment #12 Commentor: Livermore, Dave**

White-Tailed Prairie Dog Colonies

Both the Klondike Flat and Crescent Junction disposal sites are in close proximity to White-tailed prairie dog (*Cynomys leucurus*) colonies. Further, the slurry pipeline transportation route to these disposal sites would cross through White-tailed prairie dog colonies. If one of these sites were to be chosen as the preferred disposal site or if a pipeline is the preferred mode of transportation, we would recommend conducting surveys, and working closely with the UDWR to minimize any potential disturbance to these prairie dog colonies.

**Response:**

DOE concurs with the commentor's concerns. In Chapter 4.0 of the EIS and in the Biological Assessment (Appendix A1), DOE has committed to conducting the investigations recommended in the comment as part of the detailed site characterization that would be conducted if DOE selected one of these off-site disposal locations in its Record of Decision. These investigations would be undertaken in collaboration with the UDWR.

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**Document #699 Comment #13 Commentor: Livermore, Dave**

Gunnison Sage-grouse

The pipeline route to the White Mesa Mill site would impact historical habitat and be in close proximity to current populations of Gunnison sage-grouse (*Centrocercus minimus*), a federal candidate for listing as an endangered species. Coupled with the impacts to the Matheson Preserve of the proposed route, the Conservancy adamantly opposes this alternative and transportation route.

**Response:**

As conceptually presented in the EIS, the pipeline route to White Mesa Mill is in the vicinity of Gunnison sage grouse habitat. Section 4.4.7.3 of the EIS and Section A1-8.1.10 of the Biological Assessment state that investigations would be completed prior to construction of a pipeline to White Mesa Mill if that site were selected. If the alternative selected in the Record of Decision could adversely affect this species, mitigation measures would be required and undertaken.

DOE acknowledges the value of the Matheson Wetlands Preserve and the Conservancy's strong opposition to actions that would result in adverse impacts to it. DOE will consider this view in its selection of a disposal alternative in the Record of Decision.

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**Document #699 Comment #14 Commentor: Livermore, Dave**

Other State Sensitive Wildlife Species

Kit fox (*Vulpes macrotis*), burrowing owls (*Athene cunicularia*), black-footed ferrets (*Mustela nigripes*), golden eagles (*Aquila chrysaetos*) and ferruginous hawks (*Buteo regalis*) may all be impacted at the designated borrow areas or Klondike Flats and Crescent Junction disposal sites. The Conservancy recommends conducting onsite surveys in any disturbed areas and working closely with the UDWR to minimize any potential disturbance to these wildlife species of concern.

**Response:**

See response to comment #12.

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**Document #699 Comment #15 Commentor: Livermore, Dave**

Plant Species of Concern

Although, the Conservancy knows of no occurrences of special status plants in the off site disposal areas, borrow sites, or pipeline routes, we still recommend on-site surveys be conducted, at the appropriate time of year for such plants in the selected disturbed sites.

**Response:**

On-site surveys for special status plants would be conducted only if evidence pointed to their occurrence in the vicinity of proposed disturbances. In Appendix A3, Biological Opinion, the USF&WS has concurred with DOE's determination (Appendix A1, Biological Assessment) that special status plant species are unlikely to be adversely affected. However, if evidence of special status plants in the vicinity of the selected disposal site, at borrow areas, or along the selected transportation corridor became available to DOE, further investigations or surveys would likely be warranted and undertaken.

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**Document #699 Comment #16 Commentor: Livermore, Dave**

The Nature Conservancy urges the DOE to select an action alternative that will reduce the number of uncertainties, protect the biological integrity of the Colorado River and Matheson Preserve, and avoid a catastrophic event of contaminated tailings being deposited in the Colorado River and Matheson Preserve. We encourage the DOE to refine their hydrologic model and river migration calculations to include the data and information gathered by Solomon and Gardner. With these considerations in mind, the only acceptable action is to move the tailings pile to either the Klondike Flats or Crescent Junction disposal sites. This is the obvious and safe alternative.

**Response:**

DOE acknowledges and appreciates the commentor's recommendations for selecting an alternative that would reduce the number of uncertainties, protect the biological integrity of the Colorado River and Matheson Wetlands Preserve, and reduce the already low probability of a catastrophic failure that could deposit contaminated tailings in surface waters. DOE believes that it has a sufficient understanding of the hydrologic conceptual model and river migration conditions, which includes appropriate evaluation and consideration of the data and information gathered by Gardner and Solomon, to support sound decision-making. DOE is confident that surface remediation combined with active ground water remediation and the final disposal cell design and construction would reduce the possibility of short-term and long-term impacts to human health and the environment to levels that would comply with the requirements of 40 CFR 192 under any of the action alternatives analyzed in the EIS.

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